

ABSTRACT

A low-density electrically-conductive thermal insulator is a coupling of a polymer-based thermally-insulating material with an open-celled electrically-conductive base material defining a plurality of interconnected cells throughout. The open-celled, electrically-conductive base material is preferably an open-celled metallic foam material formed by an interconnected plurality of electrically-conductive ligaments. The electrically-conductive base material may be first formed into a desired shape or structure, coated such that cells in the electrically-conductive base structure are substantially filled with the insulating material, and then cured to solidify the insulating material. The electrically-conductive thermal insulator provides thermal protection while providing electrical conductivity. Further the electrically-conductive thermal insulator of the present invention is adapted to be low density, lightweight, electrically conductive, and to maintain its structural integrity under aerothermal conditions typical of high speed flight.